## Update on Tile Drainage Research at Miner Institute

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## **Tile drainage research**

# Type of best management practice: Source-based (e.g., nutrient levels) Transport (e.g., controlled drainage)



**Flow Control Mechanism** 

#### Recent summary of controlled drainage studies (Skaggs et al., 2012)

- No significant yield loss
  Reduce nitrate-N loss by up to 80%
  Lower total P loss by up to 30%
- Topographic constraints?
- Cost-effectiveness, maintenance...

#### **USDA-CIG study**





## Water flow estimation





#### Simulating controlled drainage in the laboratory



Total P (ug/L)

#### **Plot Construction**



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## **Small-plot runoff study**





## **Measuring water flows**



#### Water Yield by Hydrologic Pathway



#### Water Flow by Drainage Treatment



#### Edge-of-Field (EoF) project at Miner

#### Potential trade-off between crop production & water quality benefits for tiled and untiled?



## **USDA-EoF study**

- Monitor N, P, & sediment in surface and subsurface tile drainage water:
  - 2-year baseline period
  - 4-year treatment period
  - Free vs. controlled drainage
  - Corn yield & nutrient budgets





## **Importance of N management**



Overall Nitrogen Application Rate Effect on Nitrate-Nitrogen Concentration Corn/Soybean Rotation

Helmers, 2008

#### Annual N Loss in Tile Drainage for a Corn-Soybean Rotation with or without a Winter Cover Crop











- Tile improves internal drainage in poorly drained fields: It pays back.
- Better internal drainage reduces runoff and erosion losses.
- Good nutrient management (4-R's) critical to reduce losses in drained and undrained fields.

More data needed to assess water quality impacts of tile at multiple scales vs. undrained sites.

